Central States Forest Experiment Station,

UNITED STATES DEPARTMENT OF AGRICULTURE

FOREST SERVICE

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ANNUAL INVESTIGATIVE REPORT FOR 1927 AND PROGRAM FOR 1928

CENTRAL STATES FOREST EXPERIMENT STATION

GOVERNMENT PRINTING OFFICE

ANNUAL INVESTIGATIVE REPORT FOR 1927 AND PROGRAM FOR 1928

CENTRAL STATES FOREST EXPERIMENT STATION

E. F. McCarthy----------Director

Bernard S. Meyer-------Associate Forest Ecologist

Ralph K. Day-----------Assistant Silviculturist

Leonard F. Kellogg-----------Junior Forester

John H. Hanley----------Junior Forester

Louise L. Davis----------Senior Clerk

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ANNUAL INVESTIGATIVE REPORT FOR 1927 AND PROGRAM FOR 1928

-CENTRAL STATES FOREST EXPERIMENT STATION-

COLUMBUS, OHIO

Revised June 12, 1928

General

The Central States Forest Experiment Station was created in the first session of the 69th Congress in 1926. Under the provisions of the act, the Station was to be located, at the discretion of the Secretary of Agriculture, in the States of the Ohio Valley and Central Mississippi Valley. The Station is authorized "to conduct silvicultural, forest fire, dendrological, and other experiments and investigations, independently or in cooperation with other branches of the Federal Government, and with States, universities, colleges, county and municipal agencies, associations, and individuals, to determine the best methods for the growing, management, and protection of timber crops on forest lands and farm woodlots."

Funds for the Station were provided in the second session of the 69th Congress and active steps were taken in June 1927 to locate its headquarters. The territory served by the Station includes the states of Ohio, Indiana, Illinois, Iowa, Missouri, the western portions of Kentucky and Tennessee, and the northern part of Arkansas.

After investigation of eleven possible locations for the Station, at the invitation of agencies in the states of Ohio, Indiana, Illinois, Kentucky and Missouri, Columbus, Ohio, was selected as headquarters. This place offers distinct opportunities for carrying on the work of the Station. By a cooperative agreement between the Central States Forest Experiment Station, the Ohio State University, and the Ohio State Agricultural Experiment Station, suitable office quarters are furnished without cost to the Station and the opportunity to use the State Forest for experimental work is also provided. Columbus has very satisfactory connections by railroad, traction lines, and hard surfaced highways with other portions of the Station's territory. By virtue of its location on the campus of the Ohio State University, the Station is given the advantage of close contact with various research projects in which it is interested, since all of the graduate research conducted in state supported educational institutions is supervised from the University. This location also placed the Station closer to the extensive belt of timbered land bordering the Ohio River than would have been possible at any of the other leading educational institutions. The office quarters furnished by the University are nicely located in the Horticultural and Forestry Building and provide adequate space for the present needs of the Experiment Station.

Personnel

The present personnel of the Station consists of the Director, E. F. McCarthy, an associate Forest Ecologist, Dr. Bernard S. Meyer, an Assistant Silviculturist, Ralph K. Day, two Junior Foresters,

Leonard F. Kellogg and John H. Hanley, Senior Clerk, Mrs. Louise L. Davis, and a Junior Stenographer-Clerk. The latter place has been filled temporarily by Miss Virginia Eader, one month, and Mrs. Grace P. Bonner for the balance of the year.

Five temporary assistants were employed during parts of the field season. Three of these, Ray F. Bower, Harold F. Morey, and F. Gilbert Hills, were retained during the greater part of the field season and worked on both the oak project and flood study. In addition, Norman W. Scherer and H. P. Dickerson were employed for a short period to assist during the study of forests in relation to floods.

One place for a permanent member of the Staff which had been planned was not filled during the latter part of this year. The original plan proposed the addition of a permanent staff member of the grade of silviculturist or associate silviculturist, provided a suitable man could be found.

Advantage was taken of the light salary roll of the Station during the current year to build up the mechanical equipment and library. The library now contains sixty bound volumes and approximately six hundred bulletins, circulars, and pamphlets, besides a complete set of the Proceedings of the Society of American Foresters, Journal of Forestry, and Botanical Abstracts. A complete set of Library of Congress cards covering forestry publications from 1910 has been secured. The publications contained in the library are being catalogued and indexed on these cards.

Work Accomplished During Last Half of 1927

Relation of Forests to Floods in the Ohio Valley

This is a part of the Service project covering the study of the relation of forests to floods in the Mississippi Valley. The work of compilation of existing material and further field study was assigned to the Central States Forest Experiment Station in July of the current year. A short time was allowed for the completion of this work.

Assistance was given the Station by the Appalachian Forest Experiment Station thru the loan of Ivan H. Sims and also Dr. Charles R. Hursh. The latter reported to Columbus about the middle of July and remained for a period of about six weeks. In return the Central States Station furnished to the Appalachian Station's field party Harold F. Morey who reported to J. H. Buell at Erwin, Tennessee.

O. M. Wood of the Allegheny Forest Experiment Station rendered valuable assistance in compiling the material for the Allegheny and Monongahela drainages. He was particularly familiar with this area since his home had formerly been on the banks of the Allegheny. Through cooperation of District 7, Lewis R. Smith of the Cherokee National Forest and V. H. Cahalane of the Pisgah National Forest assisted in the study for periods of about two weeks each.

The entire staff of the Central States Station, with the exception of Kellogg who was detailed to Washington, was employed on this work until about the end of September when the report

covering the Ohio drainage was finally accepted by Assistant Forester E. A. Sherman. To accomplish the purpose of this study information was collected covering the topography, climate, soils, forest cover, and run-off for the Ohio and its tributary valleys. While very little time was allowed for field work, States Foresters and other agencies in this region were interviewed and asked to furnish information, and portions of each of the states were covered in a field examination by men assigned to the study. Maps were prepared by Hursh showing geological structure and major soil provinces for the Ohio Valley. A map showing the percentage of forest cover in different parts of the same region was also prepared.

Volume and yield in oaks

This study had been carried on under the direction of McCarthy at the Appalachian Station for two field seasons. During this time yield plots were accumulated in the states of North Carolina, Georgia, Tennessee, Kentucky, Ohio, West Virginia, Virginia, and Maryland. Since the work was not completed and it was deemed advisable to extend the study to Pennsylvania and states further west than Ohio, the project was left under McCarthy's direction on his transfer to Columbus. Through the cooperation of the Allegheny Station, Wood and Hough assisted by Morey searched Pennsylvania and central Maryland for suitable oak plots during the latter part of the summer. Henley, Hills, and Bower covered a section of Ohio about Jackson and also west of Portsmouth where previous search had not been made. Later, Hanley and Hills traveled through the lower Cumberland and Tennessee valleys, southern Indiana and Illinois, and northeastern Missouri, searching the vicinity

of old iron furnace operations for second-growth oak which had followed charcoal wood cutting. Through these efforts 38 plots were added to those previously acquired.

For the preparation of volume tables, additional stem measurements of oak second-growth were made in the vicinity of Jackson and McArthur in Ohio. The completion of this work furnished 284 yield plots which had been secured since the beginning of the study at the Appalachian Station and about 3700 tree measurements for volume tables. This material combined with about 150 oak plots previously secured in Maryland were deemed sufficient for the completion of the study. The height-age of the plots secured since 1924 are shown on the attached graph.

Arrangements were made for a computation of part of the volume tables in Washington and Day was detailed from this Station about the middle of December to assist in this work.

Yellow Poplar

The yellow poplar manuscript which had been prepared by McCarthy and left for copying by the Appalachian Station was forwarded about the middle of September after having been reviewed by Frothingham and Korstian. Pressure of other work prevented the revision of this bulletin until near the end of the year when a large part of this work was accomplished.

Cooperation

Miscellaneous

Addresses were delivered by McCarthy before the annual meeting of the American Society of Civil Engineers, the Society

of American Foresters, and the Ohio Valley Regional Conference on State Parks. Dr. Meyer delivered an address before the Botanical Section of the Association for the Advancement of Science at Nashville, Tennessee.

Arrangements were made to assist in forestry instruction at Ohio State University during the second quarter of the University year.

Tree seeds of about forty species were secured in cooperation with the Botany Department of the Ohio State University for the purpose of establishing an arboretum. Some of the acorns collected have been stored in the cold storage of the University, by direct planting in the field, and by stratification, as a test of the most desirable means of storage.

A committee of the Ohio Valley Section, Society of American Foresters was appointed to cooperate with the Station in the collection of a bibliography and list of active current projects being carried on by various forestry agencies in the Central States region. McCarthy served as a member of this committee and the work of compilation has been largely carried on by the Station under the supervision of Meyer.

Working Centers

No definite decision has yet been made with regard to the location of working centers though considerable information has been collected which will enter into the final determination of such location. A survey of the Ohio Valley region made in connection with the flood study made available some of these facts.

The soils of this region are formed principally from disintegration of sedimentary rocks and by glacial, alluvial, or wind

depositions. Below the line of Wisconsin glaciation is a belt extending across the Ohio River in which the soil is of fine clay, silt, or loessal character. Through Kentucky and Tennessee are soils derived from limestone without glacial deposit. Southern Ohio and the Cumberland sections of Kentucky and Tennessee have soils of sandstone and shale origin. In a classification of the region based upon present vegetation, four major zones must be recognized. First, the wild, more or less continuous bodies of timber found in the highland region of Tennessee and the Ozark region of Missouri; second, the more or less isolated woodlots or farm woodlands scattered through the semi-agricultural region of Kentucky, Tennessee, Ohio, and Indiana. This latter may be made to include comparatively large bodies of timber in southern Ohio, southern Indiana, and southern Illinois where earlier agricultural development caused the clearing of fields which were later abandoned. Third, belts of alluvial land along the stream bottoms subject to over-flow and too poorly drained or too hazardous for agricultural use; fourth, the upland prairies of western Indiana, Illinois, Missouri, and Iowa.

A consideration of topography makes it apparent that it has been the chief element influencing the clearing of land. The rough topography of the Central States region corresponds closely with the areas most heavily forested.

In a consideration of climate, rainfall is the most important factor, being heaviest along the southeastern margin of the Station's territory and lightest to the northwest. Later studies of the precipitation - evaporation ratio will probably be needed before active development of shelter belts and woodlots in the poorly forested

prairie region can be successfully guided.

From the information acquired it seems obvious that at least one center of work in the prairie region will be required, one or more will be required to cover problems in the woodlot section, two or more in the heavily forested sections of southern Ohio, Indiana, Illinois, and the region of the highland rim. At least one center of work will be required in the Ozark region of Missouri, and possibly another in northern Arkansas. The Station is badly in need of one good field Station where a permanent man may be assigned to carry on work of production of nursery stock and give close supervision to planting tests. If possible this field station should be established within easy travel distance of Columbus. Opportunities may be offered to establish such a working center on one of the State Forests or through cooperative use or lease of private lands. The only National Forest area now available for a working center is that in northern Arkansas, since the Knox Forest has been relinquished to the Army. One area under supervision of the Veterans Bureau is located near Chillicothe where it was originally part of Camp Sherman. This involves about five hundred acres, part of which was formerly used by the Ohio State Forestry Department as a nursery but was abandoned as unsuitable for this purpose. Specific offers of cooperation in the use of forest land have been received from the State Forest Departments of Ohio, Indiana, and Missouri.

Work Completed by Forestry Agencies in Region

The most important forestry agencies in this region are those state supported, at least one of which is now established in each of the states. In some of these states forestry work has

been under way for a period of twenty years. A state forester is now carrying on work in each of the states except Iowa, his work being usually the acquisition of state land, cooperation with woodland owners, and distribution of nursery stock. Several of the states also have extension foresters and in several states forest schools and state supported research organizations are empowered to do experimental work including studies of forest resources.

In addition to the state supported forestry agencies, universities such as the universities of Ohio, Purdue, Illinois, Chicago, Iowa, Missouri, Kentucky, Tennessee, and several smaller universities and colleges, have done research of a forestry character. This has in most cases been carried on by the botany departments or by horticultural societies and academies of science associated with the universities. The majority of work by these agencies has been studies of occurrence and range of species, relation of species to environment, and studies of vegetation in specific localities.

A bibliography assembled for this region shows about 400 published works. These comprise largely bulletins, circulars, and articles in forestry and botanical magazines and in proceedings of scientific societies.

Of this number about 130 cover general phases of forest work. These include state reports and general reports covering forest resources in states or portions of states. About 120 publications may be classified as ecological in nature. About 10 deal with phases of protection, about 25 with phases of utilization, about 20 with the relation of forests to floods, about 30 with

planting and nursery practice, about 40 with phases of management of the woodlot. The balance are largely reports upon individual tree species with a few articles on legislation and policy. The work that has been published emanates from all states in the region, although the greater bulk of it has been done in Ohio, Indiana, Illinois, and Iowa. This is probably due to the larger number of well established educational institutions as well as older state forestry departments which have been in operation continuously since their origin.

Very little of the work done thus far deals with natural stands with the exception of the woodlot. As a result little is yet known concerning the best methods of cutting in wild forests or the expected yield from even-aged or uneven-aged stands.

Since all of these states have been engaged for a considerable period of years in the distribution of nursery stock and the establishment of plantations there are now scattered through the states many good forest plantations. The bulk of these are less than twenty years old, although some of the prairie states have older plantations established through the agency of nurseries and the early needs of farmers for a wood supply in the prairie states. These older plantations are in the majority of cases intended for the supply of wood and post timber as well as shelter from wind.

Experimental Work Now Being Done

Ohio

Ohio has a well established forestry department operating under the general supervision of the agricultural experiment station. This has been built up without interruption through a period of more than twenty years. Early plantations were designed

to provide post timber for the farms and this was later followed by the establishment of plantations containing more coniferous species. A study of these plantations is now under way.

Test plantations have been established by the state forestry department in several places in the state. The most notable of these are at Wooster, near Waterloo, and in the vicinity of Cincinnati. State nurseries are now providing between one and a half and two million trees per year for planting in the state.

The woodlot has long been recognized as a problem for research in Ohio, and some statistical information has been collected with regard to the extent of grazing. During the past year a specific project covering the influence of grazing on the woodlot has been under way in the state.

Four other agencies carrying on forest research work in the state should be mentioned. The Mead Pulp and Paper Company which owns land in Ohio as well as on islands of the Mississippi, is engaged in planting for the production of pulp. This involves some experimental work. Ecological studies are being carried on by the botany department of Ohio State University and the University of Cincinnati. A study of hydridization of oaks is being carried on at Antioch College.

Indiana

There are two forestry agencies in the state of Indiana:- The state Conservation Commission, employing a State Forester, with headquarters in Indianapolis and the Department of Forestry in the College of Agriculture at Purdue University. The latter is engaged largely in teaching work although some research work is being conducted by members of the faculty. The University owns a tract

of timber land. The State Forestry Department has a state nursery and in past years has established a large number of forest plantations. The most notable single instance of such planting is that being made on the state forest near Henryville in Clarke County where the state owns about 4500 acres of land. This is largely forested but includes about 150 acres of old fields on which plantations have been established or soon will be established. Research on this tract includes test plantings and improvement of existing stands. A cordwood market has been built up to further the improvement work. The state is also carrying on administrative work under a state tax law which provides for the investigation of woodlands for the purpose of listing these lands for relief from taxation. By this means considerable information relative to grazing in the woodlot has been accumulated.

Illinois

Two agencies are engaged in forestry work, the Natural History Survey connected with the State University at Urbana and the State Forester's office located at Springfield. The Natural History Survey has made excellent progress in a study of the forest conditions of the state. Under this study the land has been classified and existing areas of woodland mapped. The Survey has also made a study of the woodlot. The State Forester's Office more recently organized, is making progress in the accumulation of state forests and the distribution of planting stock.

Iowa

The chief agency in this state is the Forest School of Iowa State College, Ames, to which is attached the Extension Forester. The chief work done thus far is the production of nursery stock

and the establishment of experimental plantations. Some earlier studies of forest conditions were made. The present Extension Forester has been engaged in the study of influence of forest cover on moisture content of soil.

Missouri

The State Department of Forestry has been organized and funds have become available during the past year. Some forest land is already set aside as state parks. Another agency in this state is the Shaw Botanical Gardens, located in St. Louis.

Kentucky

Two agencies are at work in Kentucky: the Agricultural Experiment Station which has a forest tract in eastern Kentucky, but outside the territory of this Station, and the State Forester whose office is located at Frankfort and who has a nursery established at Louisville. Earlier investigations in this state consisted largely of examination of the resources by very extensive methods. Some early plantings were made by coal and railroad companies and, in cooperation with the Forest Service, some were made on the tract owned by Berea College.

Tennessee

The chief agency operating in the territory which falls within the boundaries assigned to the Station, is the State Forester's office located in Nashville. The chief work of the Tennessee State Forester has been the establishment of a fire protection system and planting for the prevention of erosion on abandoned fields.

Arkansas

Outside of the activity of the Forest Service on the Ozark

National Forest very little current research work is reported from the northern part of this state.

Projects for 1928

It will be the policy of the Station to concentrate its work on a few projects during the current year. Three principal phases of work are contemplated:-the completion of the study of yield in oaks, the study of the older plantations especially through the prairie section, and the beginning of the study of grazing in relation to management of the woodlot. Two other projects are proposed. A preparatory exploration of the region will be made to locate areas for the conduct of cutting studies. A project covering the classification of forest types is provided to cover cooperative study of this subject.

Yield of oak

The earlier phases of this project have already been outlined. It is planned to carry out this work in cooperation with the Appalachian Station and the Allegheny Station. The purposes of continuing field work this year are chiefly, (1) to remeasure such plots in Maryland as can be found from the study previously made by Ashe and Besley, (2) to examine again the regions in all states which contain yield plots, covering, in addition to the plots already taken, those even-aged and well-stocked stands of second-growth which contain 30% or more oak, (3) to provide volume tables for such other important species as are found associated with oak, (4) to prepare tables for oak converting solid cubic feet of peeled wood to stacked cords.

This plan will involve the activity of three field parties, one of which will operate in Virginia and West Virginia, one in

Maryland, and one in southern Ohio and states to the west.

Plantations

While several of the states have established a number of plantations in the last fifteen years it is believed that many older plantations can be found especially through the states of Indiana, Illinois, and Iowa which will allow early publication of results. This study is being undertaken in an effort to decide upon desirable species and the relation of each to the forest planting sites. Special study will be made of soils in relation to the choice of species. It is hoped that the material collected by the Station combined with measurements made by the State agencies will furnish sufficient material for the preparation of tables of yield in planted stands.

Grazing in farm woodlands

This project is so important that it demands early attention with the intent to gather facts concerning the influence of grazing on the growth and reproduction of the forest. With this information in hand, advice can be furnished farmers with reference to the handling of farm woodlands. While no immediate attempt will be made to institute an economic study it is thought that considerable statistical material is already in the hands of the state agencies so that the study can be confined to basic silvicultural facts influencing the growth and reproduction of the stands.

Management - Cutting

Within the Station's territory are large areas of culled and burned wild lands. The Station expects to institute studies with

the purpose of formulating satisfactory methods of cutting for the management of this land. This type of land is largely in private ownership with the exception of the Ozark National Forest in northern Arkansas. The first survey to determine future work will cover the hardwood types of this national forest in order that the Station may be able to cooperate with District 7 in administrative studies of this character.

Classification of Types

The work of the experiment stations demands an early determination of forest types which must be recognized in all of its work. A project of this character is therefore set up with the expectation that the type classification will be made through consultation with other forest agencies rather than through extensive field work. Botany Departments of the several universities and the Ohio Valley Section of the Society of American Foresters will be taken into consideration in the type study work.

Project

To complete the study of the important northern and interior oaks and extend it to include the effect of lower percentages of oak on the yield.

Purpose

To supply information as to volume, growth, yield, and silvicultural characteristics of the oak species found in the northern and interior region of eastern United States.

Status

Continued from the project originally set up for work at the Appalachian Forest Experiment Station in 1924.

Plans for current year

To obtain 200 to 300 additional plots in which oak represents 30 to 75 per cent of the dominant stand by number.

To obtain enough measurements of tree species associated with oak to construct volume tables needed for calculation of yield.

Further measurements to provide a conversion factor of solid cubic feet to stacked cords.

Study of decay in oak resulting from fire scars and other causes. These measurements will be made in a mill scale study.

Cooperation

With Appalachian Forest Experiment Station and Alleghony Forest Experiment Station.

Project

Study of forest plantations in the central states.

Object

To determine from a study of existing plantations -

1. Suitability of native and exotic species for forest planting in the region.

2. Response to varying conditions of soil, climatic and other factors.

3. To summarize the results of work by other agencies so that a plan for continuation of planting tests can be carried on.

Status

New project.

Plans for current year

Review of published work.

Compilation of projects under way by other agencies.

Field examination and measurement of plantations.

Cooperation

Attempt will be made to cooperate with state forester organizations, extension foresters, schools of forestry, Departments of Conservation, Natural History Survey of Illinois, and other agencies actively interested.

Date of Completion

Tentatively set at Spring of 1930.

Assignment

L. F. Kellogg

Character of publication

Technical bulletin

Project

Study of the relation of grazing to farm woodlands.

Object

To determine:-

1. The extent and degree to which grazing is damaging the woodlands enclosed within the farm fences.

2. The relative resistance of tree species to grazing damage

3. The effect of grazing on the under-growth, humus, soil and moisture retention of isolated timber stands.

4. The rate of natural recovery of grazed woodland following exclusion of stock. This involves a study of natural regeneration under various forest floor conditions.

Status

New project.

Plans for current year

A general survey of the region, probably by selected counties which will be thoroughly examined to obtain:-

1. Statistics as to character of grazing.

2. Public feeling in regard to woodlot grazing.

3. An extensive reconnaissance to secure records of a representative number of woodlots.

4. A selection of sections where more intensive permanent work can be carried on.

5. Seeding tests may be conducted at Columbus over the winte

Cooperation

State agencies will be given an opportunity to cooperate.

Date of Completion

Indefinite.

Form of publication

Technical bulletin

Assignment Dr. B. S. Meyer

Project

Methods of cutting native upland hardwood stands chiefly in the Ozark region of Missouri and Arkansas.

Object

This project is proposed at this time to allow investigation of the region for selection of areas to be studied later. Cooperation may be arranged with the Supervisor of the Ozark National Forest in the study of cutting in white oak stands.

Status

New project.

Plans for current year

Survey of the region--no actual field measurements.

Cooperation

D. 7 and state agencies.

Date of completion

Continuing project.

Form of publication

Not decided.

Assignment

E. F. McCarthy

Project

Definition of types for the region.

Object

To list and describe the forest types of the region so that the other field work may be based on them.

Status

New project.

Plans for current year

An attempt will be made to get a committee of the Ohio Valley Section, Society of American Foresters, appointed to carry on this study cooperatively with this station. Little field work will be undertaken, except notations by field crews.

Date of Completion

1929.

Publication

Journal of Forestry or similar periodical.

Assignment

Member of staff to be selected later.

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RS

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CURRENT FOREST PROJECTS BY OTHER AGENCIES

IN THE CENTRAL STATES REGION

Illinois - Inventory of the extent, composition, density, yield, etc. of the Illinois Forest. State Natural History Survey of Illinois. - Sixty-six per cent of the State already covered see first, second, and third report on the Forestry Survey of Illinois. Additional areas will be covered as the need arises.

Symbiosis of deciduous forests. Dr. W. B. McDougall, University of Illinois, Department of Botany. - This investigation consists of morphological and observational work at present. The studies will be continued, and culture work will be pursued in the future.

Sand dunes of Lake Michigan, Dr. G. D. Fuller, University of Chicago, Department of Botany, with some cooperation from the Carnegie Institute of Washington. - This study will deal with the extent of the dune areas in Michigan and Indiana, and the succession of forest vegetation thereon. Most of the data is at hand and will be assembled as a bulletin as soon as time is found available.

Methods of controlling the locust borer, State Natural History Survey of Illinois. W. P. Flint, Entomologist. - This investigation has been in progress for ten years. Work has been done on the inoculation of trees, poison baits, and on destroying the borers with a combination of tanglefoot and sodium arsenite. (See Journal Econ. Ent. April, 1927.)

Indiana - Reforestation studies. Division of Forestry, State of Indiana. - These studies include plantations by direct seeding, by cuttings, and by seedling. Numerous species of both conifers and hardwoods are included. A windbreak, and arboretum, and a plantation of Christmas trees, are included in this general project. The total area of these plantings, which total over 110 separate tracts, is 327 acres.

Nursery studies. Division of Forestry, State of Indiana.- These studies include attempts to control diseases by means of various preventive and fundicidal measures, effects of various types of seed bed, and effect of arsenate of lead in controlling the white grub.

Silvicultural studies. Division of Forestry, State of Indiana. - Several tracts cleared of undesirable species, defective trees, etc., and reinforced with seed or replanted to better species. Some of these tracts are being used in a fire study.

Utilization study. Division of Forestry, State of Indiana. - Cross ties, lumber, fuelwood, and hickory poles harvested from a fifty-five acre tract with financial yields, cost, etc. compiled and recorded. Another seventy-five acre tract will be likewise handled in 1928.

Mensuration studies. Division of Forestry, State of Indiana.- In connection with utilization studies data for oaks and hickories have been taken showing age, crown, radius, tie-logs, board feet, height, and D.B.H. for 1000 to 5000 trees. As many more trees will be recorded in 1928.

Meteorology. Division of Forestry, State of Indiana. - Temperature and precipitation data at the official station in Clark County State Forest, Henryville, since 1912.

Iowa - Propagation of better varieties of nut trees. Iowa Agricultural Experiment Station. - Superior varieties of nut trees are being collected and propagated by budding. Test plots are to be made of the budded stock.

Management of native woodlands. Iowa Agricultural Experiment Station. It is planned to work out a system of management which would be effective and profitable in the handling of native woodlands.

Growth and returns of white pine, European larch, and hardwoods. (Principally black walnut.) Iowa Agricultural Experiment Station. - To study existing plantations with special reference to figures on the growth and returns under Iowa conditions.

Reforestation studies. Iowa Agricultural Experiment Station.- Reforestation studies with the hardy catalpa, Carolina poplar, and black walnut. Most of these plantations are on land subject to overflow. One catalpa plantation is on upland soil. A study of the under-planting of white pine beneath hardwoods is also in progress.

Reforestation of waste land including shelterbelt planting. Iowa Agricultural Experiment Station in cooperation with the Iowa Conservation Commission. - Both conifers and hardwood species will be used. Species will be tested out on sandy lands, eroding slopes, and waste areas. It is hoped to reclaim some of these for recreational use. Planting is being made yearly as stock is produced.

Preservative treatment of fence posts. Iowa Agricultural Experiment Station, in cooperation with the U.S.Forest Service in the early stages. - Bulletin published in 1915. An extensive bulletin has also been published on this subject. The study is being continued.

Marketing of wood and woodland products in Iowa. Iowa Agricultural Experiment Station. - To determine what conditions exist which favor or hinder the marketing of local wood products and the problems involved. Bulletin published in 1913 in cooperation with the U.S.Forest Service. (Woodusing industries of Iowa.) Data exist for a bulletin ten years later, but it has not yet been published.

Ohio - Hybridization studies in oaks. Dr. O. L. Inman, Antioch College, Department of Biology. - An attempt is being made to develop oaks with a better quality of lumber, greater resistance to fungi, etc., by hybridization experiments. The work is just being initiated.

Experimental planting. State Forester and staff at the Ohio Agricultural Experiment Station. The purpose of production of nursery stock by the state has been chiefly to provide stock for experimental planting. About 50 acres of such planting has been done in the last 20 years at Wooster and other series of plantations are located in other sections of the state. Some of this work has also been done by private agencies under direction of the Forester's office. Bulletin report now in preparation - Paton.

Grazing in relation to the woodlot. Ohio State Forestry Department. Leffelman. Specific research under way for a year past.

Survey of the natural vegetation and successions in Ohio and adjacent states. Dr. E. N. Transeau and Dr. H. C. Sampson, Ohio State University, Department of Botany. - Reconnaissance survey may be extended to Indiana, Pennsylvania, and New York.

Plant communities of the Hazelwood preserve, Hamilton County. University of Cincinnati, Department of Botany. John Segelken, under direction of Dr. E. Lucy Braun. - In progress. Location of communities mapped; transects plotted.

Development of yellow poplar seedlings on natural sites.- Meade Fibre Co. K.A.Swenning. - Seeds sown on favorable site on which the ground was slightly worked. First season's germination poor. This was attributed to too much shade.

Sample plot studies of the growth rate of poplar in plantations. The Meade Fibre Co. K.A.Swenning. - 32½ acre plots measured annually for D.B.H. over a period of 14 years. Some also measured for height.

Regeneration studies. The Meade Fibre Company, K.A.Swenning. - Regeneration studies of cottonwood and tulip poplar. Studies on the cottonwood principally to secure regeneration on old islands in the Mississippi River Basin. Studies on the tulip poplar are of regeneration on various sites, and under several methods of handling.

Planting studies. The Meade Fibre Company, K.A.Swenning. Planting studies of cottonwood, tulip poplar, and silver maple. Includes thinning and spacing studies. A study is also being made of the use of pine as a cover crop for the establishment of tulip in old fields on ridge tops. These studies are not confined to Ohio.

Research on problems involved in the care of shade and ornamental trees. Davey Tree Expert Co., Kent, Ohio. Homer L. Jacobs and others. - Research in progress on materials for tree surgery, prevention of injury from borers, etc. by the injection of chemicals, fertilization of shade trees, diagnosis of tree diseases.

Tennessee- Under-planting black locust. Division of Forestry, State of Tennessee. Black Locust will be underplanted with yellow poplar, yellow pine, white pine, walnut, and perhaps oak. Different spacings of locust and different preparations of the soil will also be used. Experimentation will also be conducted in locust borer control.

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McCarthy, E.F.	Members of the Staff of the Central States Forest Experiment Station and Others. Report of the Ohio River Watershed -(Part of a report bringing together available information upon the location and area of protective forests needed in the Mississippi watershed.)

Reports to be Written in 1928

Author	Title
McCarthy, E.F.	The Work of the Forest Experiment Station. Ohio State Forestry Association, Feb. 1,1928
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	Forest Problems in the Hardwoods. Tenth Southern Forestry Congress, Louisville, Ky., Feb. 14, 1928.
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